

REMARKS/ARGUMENTS

Favorable reconsideration of this application is respectfully requested.

Claims 1-19 are pending in this application.

The outstanding Office Action includes a rejection of Claims 1, 3-5, 7-11, 13, 14, and 16-19 under 35 U.S.C. § 102(b) as being anticipated by Paulraj et al (U. S. Patent No. 6,351,499, Paulraj) and a rejection of Claims 2, 3, 6, 8, 12, 13, 15, and 17 under 35 U.S.C. § 103(a) as being unpatentable over Paulraj in view of Hadad (U. S. Patent No. 7,133,352).

Before addressing the outstanding art rejections it is believed that a brief review of the claimed subject matter would be helpful.

In this regard, the invention includes, in one aspect, a wireless communication system including a transmitter device and a receiver device adopting a space time transmit diversity multicarrier CDMA scheme.

In this system aspect of the invention and in a separate transmitter aspect, the transmitter includes an encoding interleaving arrangement that encodes transmit data by performing error correction and then interleaves the encoded data, a mapping arrangement that maps output signals from the encoding interleaving arrangement to signal points on a conjugate plane. Also included is a serial to parallel conversion arrangement that converts output signals from the mapping arrangement into Nc/SF parallel signals, where Nc is an integer representing the number of points of inverse fast Fourier transform and SF is an integer and a submultiple of Nc and Nc/SF space time transmit diversity encoding arrangement that encodes the resulting Nc/SF parallel signals in a time direction and in a space direction. A plurality of multicarrier CDMA elements are provided to respectively copy in parallel the output signals from the Nc/SF space time transmit diversity encoding to SF signals, to respectively spread the copied signals, to respectively perform inverse fast Fourier transform of Nc points with respect to spread signals, and to respectively convert

transformed parallel signals into serial signals. A plurality of transmit antennas are provided for respectively transmitting output signals from the plurality of multicarrier CDMA transmit elements to be received by the receiver.

In the system aspect of the invention and in a receiver aspect, the receiver has a plurality of receive antennas, a plurality of multicarrier CDMA receiver sections to respectively convert received signals from the plurality of receive antennas into parallel signals, to respectively perform fast Fourier transform of the converted parallel signals, to respectively inversely spread transformed signals, and to respectively equalize and combine inversely spread signals. A space time transmit diversity decoding arrangement is also provided to decode in both a time direction and in a space direction output signals from the plurality of multicarrier CDMA receiver sections and a parallel to serial converter is provided to convert output signals from space time transmit diversity decoding arrangement into serial signals that are de-mapped by a de-mapping arrangement and provided then to a decoding de-interleaving arrangement that de-interleaves the output signals from the de-mapping arrangement to provide de-interleaved data and decodes the de-interleaved data by performing error correction.

As should be clear, the claimed invention is not concerned with a single carrier transmitting and receiving system or a single carrier transmitter or receiver like the standard single carrier scheme known as code-division multiple access or CDMA. In this regard and as well understood by the artisan, CDMA involves a multiplexing technique in which a number of users can simultaneously and asynchronously access a channel. Contrary to the apparent assumption made in the outstanding Action, the artisan would understand that the Paulraj teaching of CDMA, as well as TDMA and FDMA, relate to a standard single carrier scheme.

On the other hand, the artisan is familiar with the standard orthogonal frequency-division multiplexing (OFDMA) scheme as a multi-carrier modulation scheme, but not the same scheme as the multi-carrier CDMA (MC-CDMA) scheme. In this respect, MC-CDMA, unlike OFDMA executes frequency diversity wherein the same information signal is transmitted and received simultaneously on two or more independent carrier frequencies by using a single processing system of inverse fast Fourier transform (IFFT)/fast Fourier transform (FFT).

As to the art recognized differences between MC-CDMA and either CDMA or OFDMA, applicants note pages 126-133 of the “OVERVIEW OF MULTICARRIER CDMA” IEEE Communications Magazine article of December 1997 by Hara et al. that was included (cited as document “AW”) with the IDS filed on July 26, 2003.

To whatever extent that Paulraj teaches Space-Time Coding, it is with regard to a standard single carrier scheme, such as CDMA, or with regard to the completely different ODFMA scheme associated with the embodiment of FIGS. 6 and 7. There are no teachings or suggestions in Paulraj of implementing the suggested Space-Time Coding with the MC-CDMA scheme. Thus, relative to independent Claims 1 and 11 there is no teaching or suggestion to be found in Paulraj having the claimed “Nc/SF space time transmit diversity encoding means for encoding in time direction and in space direction the parallel signals from said serial to parallel conversion means,” or the corresponding “space time transmit diversity decoding means” of independent Claims 5 and 11 that will decode the output signals from the “plurality of muticarrier CDMA receive means.” The implementation of such space time transmit diversity (STTD) encoding-decoding relative to a data symbol consisting of Nc/SF sub-carriers in the time direction permits the use of smaller and simpler circuitry.

Also, there are no teachings or suggestions in Paulraj as to the “mapping means” of independent Claims 1 and 11 at col. 9, lines 1-13, as indicated in the outstanding Action. In

this regard, these relied upon teachings from col. 9, lines 1-13, of Paulraj relate to providing transmit signals assigned to different antennas, not to mapping output signals "to signal points on a conjugate plane."

Further, the outstanding Action improperly asserts "inherent" as to the recited de-mapping means of Claims 5 and 11. In this regard, it is well established that "[i]n relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (BPAI 1990) (emphasis in original). There is no explanation in the outstanding Action as to any reason why a "re-mapping means" would be inherently present between the parallel to serial converer 96 and de-interleaver de-coder 98 of FDIOG. 45 of Paulraj.

Besides this improper reliance on inherency as to independent Claims 5 and 11, the outstanding Action improperly relies on elements 126 and 128 from the OFDMA embodiment of the FIG. 7 arrangement of Paulraj as if there were a teaching in Paulraj to employ these elements with the FIG. 4 arrangement. In this regard, anticipation requires the citation of a single prior art reference that discloses each and every element arranged together exactly as in the claimed arrangement. See *In re Bond*, 15 USPQ2d 1566 (Fed. Cir. 1990); *Lindemann Maschinen Fabrik GMBH v. American Hoist & Derrick Co.*, 221 USPQ 481 (Fed. Cir. 1984); *Ex parte Gould*, 6 USPQ2d 1680 (BPAI. 1987); and *Ex parte Osmond*, 191 USPQ 334 (BPAI. 1973). Thus, and as fully explained by the Board in Osmond, at 191 USPQ 336, isolated teachings having no teaching as to combining such isolated teachings cannot be said to anticipate a claimed invention simply because these unconnected features all appear in one reference. There must always be something in the reference directing the person skilled in the pertinent art to make the selections necessary from all the isolated

disclosures of the reference to formulate a combination having the specific combination of features claimed.

Similarly, there is no teaching in Paulraj suggesting the use of elements 122 and 124 from the OFDMA embodiment of the FIG. 6 arrangement of Paulraj are to be incorporated into the Paulraj FIG. 3 arrangement. Thus, the reliance on this mixture of elements from two different embodiments to “anticipate” independent Claims 1 and 11 is further improper.

Also, Claims 1 and 11 require a “plurality of multicarrier CDMA transmit means for respectively copying in parallel output signals from said Nc/SF space time transmit diversity encoding means to SF signals” (as taught in Fig. 1, note the output from STTD encoders 14 to copier sections 151). No such “copying” is taught or suggested by Paulraj nor is this limitation indicated in the outstanding Action as even remotely corresponding to any disclosure in Paulraj. This failure to indicate where the teaching appears in the relied upon reference is a violation of controlling court precedent. *See In re Rijckaert*, 9 F. 3d 1531, 1533, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (“When the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, it must indicate where such a teaching or suggestion appears in the reference.”).

Accordingly, the 35 U.S.C. § 102(b) anticipation rejection asserted as to independent Claims 1, 5, and 11 is traversed as to each of these claims for the reasons set forth above, and the withdrawal thereof is respectfully requested.

As Claims 3, 4, 7-10, 13, 14, and 16-19 depend either directly or indirectly on one or the other of these above-noted independent claims and, thus, include all the limitations thereof, the 35 U.S.C. § 102(b) anticipation rejection asserted as to dependent Claims 3, 4, 7-10, 13, 14, and 16-19 is traversed as to each of these claims for the reasons set forth above, and the withdrawal thereof is respectfully requested.

In addition, each of dependent Claims 3, 4, 7-10, 13, 14, and 16-19 recite additional features not taught or suggested by Paulraj and further patentably distinguish over this reference for this reason as well.

With further regard to dependent Claims 2, 3, 6, 8, 12, 13, 15, and 17 under 35 U.S.C. § 103(a) as being unpatentable over Paulraj in view of Hadad, it is first noted that Hadad cures none of the above-noted deficiencies of Paulraj. Moreover, as these dependent claims depend either directly or indirectly on one or the other of these above-noted independent claims and, thus, include all the limitations thereof, the obviousness rejection asserted as to dependent Claims 2, 3, 6, 8, 12, 13, 15, and 17 is traversed as to each of these claims because neither of the applied references teach all the limitations of these claims. Accordingly, the withdrawal of this obviousness rejection is also respectfully requested.

In addition, each of dependent Claims 2, 3, 6, 8, 12, 13, 15, and 17 recite additional features not taught or suggested by Paulraj taken alone or with Hadad in any proper combination, and accordingly, these dependent claims are respectfully submitted to further patentably distinguish over these references for this reason as well.

As no further issues are believed to remain outstanding in the present application, it is believed that this application is clearly in condition for formal allowance and an early and favorable action to that effect is, therefore, respectfully requested.

Respectfully submitted,

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